



MALAYSIAN STANDARD

MS 1936:2016

Electrical installations of buildings - Guide to MS IEC 60364 (First revision)

ICS: 29.020; 91.140.50

Descriptors: guide, electrical installation, buildings

© Copyright 2016

DEPARTMENT OF STANDARDS MALAYSIA

DEVELOPMENT OF MALAYSIAN STANDARDS

The **Department of Standards Malaysia (STANDARDS MALAYSIA)** is the national standards and accreditation body of Malaysia.

The main function of STANDARDS MALAYSIA is to foster and promote standards, standardisation and accreditation as a means of advancing the national economy, promoting industrial efficiency and development, benefiting the health and safety of the public, protecting the consumers, facilitating domestic and international trade and furthering international cooperation in relation to standards and standardisation.

Malaysian Standards (MS) are developed through consensus by committees which comprise balanced representation of producers, users, consumers and others with relevant interests, as may be appropriate to the subject at hand. To the greatest extent possible, Malaysian Standards are aligned to or are adoption of international standards. Approval of a standard as a Malaysian Standard is governed by the Standards of Malaysia Act 1996 [Act 549]. Malaysian Standards are reviewed periodically. The use of Malaysian Standards is voluntary except in so far as they are made mandatory by regulatory authorities by means of regulations, local by-laws or any other similar ways.

For the purposes of Malaysian Standards, the following definitions apply:

Revision: A process where existing Malaysian Standard is reviewed and updated which resulted in the publication of a new edition of the Malaysian Standard.

Confirmed MS: A Malaysian Standard that has been reviewed by the responsible committee and confirmed that its contents are current.

Amendment: A process where a provision(s) of existing Malaysian Standard is altered. The changes are indicated in an amendment page which is incorporated into the existing Malaysian Standard. Amendments can be of technical and/or editorial nature.

Technical corrigendum: A corrected reprint of the current edition which is issued to correct either a technical error or ambiguity in a Malaysian Standard inadvertently introduced either in drafting or in printing and which could lead to incorrect or unsafe application of the publication.

NOTE: Technical corrigenda are not to correct errors which can be assumed to have no consequences in the application of the MS, for example minor printing errors.

STANDARDS MALAYSIA has appointed **SIRIM Berhad** as the agent to develop, distribute and sell Malaysian Standards.

For further information on Malaysian Standards, please contact:

Department of Standards Malaysia
Ministry of Science, Technology and Innovation
Level 1 & 2, Block 2300, Century Square
Jalan Usahawan
63000 Cyberjaya
Selangor Darul Ehsan
MALAYSIA

Tel: 60 3 8318 0002
Fax: 60 3 8319 3131
<http://www.jsm.gov.my>
E-mail: central@jsm.gov.my

OR **SIRIM Berhad**
(Company No. 367474 - V)
1, Persiaran Dato' Menteri
Section 2, P. O. Box 7035
40700 Shah Alam
Selangor Darul Ehsan
MALAYSIA

Tel: 60 3 5544 6000
Fax: 60 3 5510 8095
<http://www.sirim.my>
E-mail: msonline@sirim.my

Contents

	Page
Committee representation	iv
Foreword	v
Introduction.....	vi
1 Scope.....	1
2 Normative references	1
 Section 1: Fundamental principles, assessment of general characteristics and definitions	
1.1 Protection for safety	3
1.2 Design of the electrical installation	4
1.3 Selection of electrical equipment	5
1.4 Erection and initial verification of electrical installation	5
1.5 Assessment of general characteristics	6
1.6 Division of installation	7
1.7 Compatibility.....	7
1.8 Maintainability	8
1.9 Safety services.....	8
 Section 2: Protection for safety - Protection against electric shock	
2.1 Protection against both direct and indirect contact	8
2.2 Protection against direct contact	9
2.3 Protection against indirect contact	12
 Section 3: Protection for safety - Protection against thermal effects	
3.1 Protection against fire	15
3.2 Protection against burns	16
3.3 Protection against overheating	17
3.4 Requirements of thermal cut-off devices	17
 Section 4: Protection for safety - Protection against overcurrent	
4.1 Overload current	17
4.2 Overcurrent	17
4.3 Requirement to provide overcurrent protection device (OPD) for all phases.....	17
4.4 Protection of neutral conductor in a TT system	17
4.5 Nature of overcurrent protective devices	18
4.6 Protection against overload current device: Miniature circuit breaker (MCB).....	18
4.7 Protection against short-circuit current	19
4.8 Co-ordination of overload and short circuit protection.....	21
4.9 Limit of overcurrent by characteristics of supply source	21

Contents *(continued)*

	Page
Section 5: Protection for safety - Protection against voltage disturbances and electromagnetic disturbances	
5.1 Protection of LV installations against temporary overvoltages and faults between high voltage system and earth.....	21
5.2 Protection against overvoltages of atmospheric origin or due to switching	25
5.3 Selection of equipment	26
5.4 Mitigating the effects of EMI on signal connections	27
5.5 Protection against undervoltage	27
Section 6: Selection and erection of electrical equipment - Common rules	
6.1 Compliance with standards	27
6.2 Operation conditions and external influences	27
6.3 Accessibility	28
6.4 Identification	28
6.5 Prevention of mutual detrimental influence	29
Section 7: Selection and erection of electrical equipment - Wiring systems	
7.1 Types of wiring systems	30
7.2 Selection and erection of wiring systems in relation to external influence.....	30
7.3 Current carrying capacities	33
7.4 Cross sectional areas of conductors	34
7.5 Voltage drop in consumers installations	35
7.6 Electrical connections	37
7.7 Selection and erection of wiring systems to minimise the spread of fire.....	37
7.8 Proximity of wiring systems to the services	39
7.9 Maintenance considerations	39
Section 8: Selection and erection of electrical equipment - Isolation, switching and control	
8.1 General requirements	39
8.2 Devices for protection against indirect contact by automatic disconnection of supply	39
8.3 Devices for protection against thermal effects	40
8.4 Devices for protection against overcurrent.....	41
8.5 Devices for protection against electromagnetic and voltage disturbance	41
8.6 Coordination of various protective devices	45
8.7 Isolation and switching	45
Section 9: Selection and erection of electrical equipment - Earthing arrangements and protective conductors	
9.1 Definitions	48
9.2 General requirements of earthing arrangements.....	49

Contents (concluded)

	Page
9.3 Protective conductors	53
9.4 Protective bonding conductors	55
9.5 Illustration	56
 Section 10: Selection and erection of electrical equipment - Other equipment	
10.1 Low voltage generating sets	59
10.2 Safety services	60
10.3 Luminaires and lighting installations.....	61
 Section 11: Verification - Initial verification	
11.1 General	62
11.2 Visual inspection	63
11.3 Testing	64
 Section 12: Comparisons of MS IEC 60364 with IEE wiring regulations 16th edition.....	
	66
 Section 13: Examples on the use of this standard	
13.1 Example of a residential house	70
13.2 Example of a commercial building	75
13.3 Example of a factory.....	79
 Annex A History background of electricity industry in Malaysia.....	
	85
 Bibliography	
	87

Committee representation

The Industry Standards Committee on Generation, Transmission and Distribution of Energy (ISC E) under whose authority this Malaysian Standard was developed, comprises representatives from the following organisations:

Association of Consulting Engineers Malaysia
Department of Standards Malaysia
Federation of Malaysian Manufacturers
Jabatan Kerja Raya Malaysia
Malaysia Nuclear Power Corporation
Malaysian Association of Standards Users
Malaysian Cable Manufacturers Association
Malaysian Electrical Appliances and Distributors Association
Malaysian Green Technology Corporation
Persatuan Kontraktor Elektrikal dan Mekanikal Melayu Malaysia
Sabah Electricity Sdn Bhd
Sarawak Energy Berhad
SIRIM Berhad (Secretariat)
SIRIM QAS International Sdn Bhd
Suruhanjaya Komunikasi dan Multimedia Malaysia
Suruhanjaya Tenaga
Sustainable Energy Development Authority Malaysia
Tenaga Nasional Berhad
The Electrical and Electronics Association of Malaysia
The Institution of Engineers, Malaysia
Universiti Malaya

The Technical Committee on Electrical Installation, Protection and Insulation Practice which supervised the development of this Malaysian Standard is managed by The Electrical and Electronics Association of Malaysia (TEEAM) in its capacity as an authorised Standards-Writing Organisation and consists of representatives from the following organisations:

Association of Consulting Engineers Malaysia
EITA Resources Berhad
G. H. Liew Engineering (1990) Sdn Bhd
Jabatan Bomba dan Penyelamat Malaysia
Jabatan Kerja Raya Malaysia
Sabah Electricity Sdn Bhd
Sarawak Energy Berhad
SIRIM QAS International Sdn Bhd
Suruhanjaya Tenaga
Tenaga Nasional Berhad (Distribution Division)
Tenaga Nasional Berhad (Generation Division)
The Electrical and Electronics Association of Malaysia (Secretariat)
The Institution of Engineers, Malaysia
Time Era Sdn Bhd
Universiti Malaya

The Working Group on Electrical Installation of Buildings which developed this Malaysian Standard consists of representatives from the following organisations:

Abbaco Controls Sdn Bhd
Covis Sdn Bhd
Mektricon Sdn Bhd
The Electrical and Electronics Association of Malaysia (Secretariat)
The Institution of Engineers, Malaysia

Foreword

This Malaysian Standard was developed by the Working Group on Electrical Installation of Buildings under the authority of the Industry Standards Committee on Generation, Transmission and Distribution of Energy. Development of this standard was carried out by The Electrical and Electronics Association of Malaysia which is the Standards-Writing Organisation (SWO) appointed by SIRIM Berhad to develop standards for electrical installation, protection and insulation practices.

This standard is not intended to replace MS IEC 60364, *Electrical installations of buildings*. It incorporates the Malaysian national deviations and orientation in the application of the Malaysian Standards in compliance with Malaysian national regulatory frameworks and with due consideration given to prevailing electrical installations practices.

Major modifications in this revision are as follows:

- a) Amendmends to standard voltages as per IEC 60038: IEC Standard Voltages (To comply with Suruhanjaya Tenaga - *Pemberitahuan: Voltan Nominal*).
- b) Additional requirements for Residual Current Device (RCD).
- c) Additional requirements for Surge Protection Device (SPD).
- d) Additional requirements for cable installation and management method to harmonize with MS 1979.
- e) Revised voltage drop requirements as per IEC 60364.
- f) General requirements of earthing arrangements to harmonize with MS 1979.

This Malaysian Standard cancels and replaces MS 1936:2007, *Electrical installation of buildings - Guide to MS IEC 60364*.

Compliance with a Malaysian Standard does not of itself confer immunity from legal obligations.